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#### USSR EXPERIMENTS IN BRIQUETTING ANTHRACITE CULM

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In screening run-of-the-mine anthracite, a great amount of culm is obtained. The most expedient way of utilizing this is in coal-dust-burning installations, but such installations exist in only a few enterprises. When the culm is burned on ordinary grates, much of it is lost either by falling through the grate or going up the flue.

This situation can be remedied by briquetting the anthracite culm and transforming it into a high-grade fuel. Lean coal with a volatile-substance content of about 13 percent has already been briquetted by the Moapino Briquetting Combine and other industrial enterprises, using coal-tar pitch as a binder. Industrial installations have not yet been designed for briquetting anthracite culm (volatile-substance content, 4 percent), and results of laboratory tests have not, so far as the author knows, been published.

The main problem to be solved in connection with briquetting is the selection of an inexpensive, plentiful binder, the minimum consumption of which will assure the greatest simplicity of the process and result, as well, in high technical indexes: adequate mechanical toughness, thermal stability, and water resistance of the finished briquette.

In this connection, a method of briquetting culm with the organic part of acid tar used as a binder is worthy of consideration. This method has been tested in the laboratory of the Ukrainian Scientific Research Institute of Local Fuels. (Large amounts of acid tar are available at the relatively low cost of about 50 rubles per ton.) For the experiments, anthracite culm from mines of the Khartsyzsk Mine Administration, Stalinugol' Trust, Ministry of Local Fuel Industry of the Ukrainian SSR, was used. A screen analysis of run-of-the-mine coal is given in the following table:

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No of Mine	Classes (percent)			
	>25 mm	25-13 mm	13-6 mm	6-0 mm
21	9.78	11.92	15.94	62.36
28	21.06	18.35	13.94	46.65
30	---	11.95	9.21	78.84
38	---	16.45	12.27	71.28

Acid tar is a viscous substance containing a considerable amount of free sulfuric acid. To obtain the organic part of it, the acid tar is treated with water and heated. As a result, it separates into three layers. The top layer of hydrocarbons and the bottom layer, a solution of sulfuric acid, are removed, leaving the middle layer, about 65 percent of the original acid tar. This substance, when cooled, is a brittle, easily crushed mass which can serve as a binder.

In making the experimental briquettes, anthracite culm from 0-4 millimeter in size was combined with from 4.8-10 percent of binder and heated to 70-75 degrees centigrade, with the pressure of the press ranging from 200-400 kilograms per square centimeter. The briquettes were 35 millimeters in diameter. The compressive strength of the briquettes was determined with a small hydraulic press with a 4-ton capacity. The briquettes' resistance to impact was determined by the number of times they could fall a distance of 2 meters onto an iron plate without disintegrating. The following table indicates the conditions under which briquetting took place, as well as the quality of the resulting briquettes:

Percent of Additive Binder	Pressure of Press (kg/sq cm)	Mixture Content		Quality of Briquettes	
		Moisture (%)	Ash (%)	Compressive Strength (kg/sq cm)	Resistance to Impact
4.8	240	5.94	15.8	Not determined	3.0
10.0	240	5.94	14.5	85.5	Not determined
8.0	240	5.03	16.3	73.3	21.2
6.0	240	5.03	16.3	49.1	13.0
8.0	240	5.03	16.3	75.1	23.2
10.0	240	6.92	16.5	89.3	24.4
10.0	440	6.92	16.5	131.3	50.1

At the time of the experiment, more than 2,000 briquettes were made, and thermotechnical experiments were carried out only in a house stove. During the course of the experiments, not a single case was noted where the briquette disintegrated in the fire. It remained stable until complete combustion had been achieved and not even part of its surface disintegrated under the impact.

The organic part of acid tar is similar in its qualities to coal-tar pitch. Therefore, equipment for a briquetting plant to make briquettes out of anthracite culm with the organic part of acid tar as an additive can be selected from equipment issued by the USSR industry for existing briquetting plants.

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Conclusions

1. Experiments have yielded briquettes with the following indexes: compressive strength, 87.4 kilograms per square centimeter; resistance to impact, 24.4; and resistance to water, high. Such briquettes have had the following specifications: shape, cylindrical; diameter, 35 millimeters; height, 28 millimeters; pressure of press, 240 kilograms per square centimeter, at a temperature of 75 degrees centigrade; and contents, 90-percent anthracite culm and 10-percent organic part of acid tar.

2. Such briquettes are completely suitable for burning in house stoves.

3. The substitution of the organic part of acid tar for coal-tar pitch in the making of briquettes will reduce production costs approximately 10 percent.

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